

### **REMARKS**

The Examiner is thanked for the thorough examination of the application. No new matter is believed to be added to the application by this Amendment.

### **Entry of Amendment**

Entry of this Amendment under 37 C.F.R. §1.116 is respectfully requested because it cancels a claim and places the application in condition for allowance. Alternately, entry is requested as placing the application in better form for appeal.

### **Status Of The Claims**

Upon entry of this Amendment, claims 1-23, 25 and 26 and 28-36 are pending in the above-identified application. Claims 2-19, 22 and 30-32 have been withdrawn from consideration by the Examiner. Claim 24 is cancelled and its subject matter is incorporated into claim 1. Claim 36 finds support in claims 1, 23 and 29. Since the Examiner has already considered the limitations of claims 1, 23 and 29, no new issues requiring further consideration and/or search are raised by claim 36.

### **Rejections Under 35 U.S.C. §103(a)**

Claims 1, 20, 21, 24-26, 28, 33 and 34 have been rejected under 35 U.S.C. §103(a) as being obvious over Cummin '830 (USP 3,252,830) in view of Yokoyama '971 (USP 5,080,971).

Claim 23 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Cummin '830 in light of Yokoyama '971 and further in view of Yanagihara '799 (USP 4,693,799).

Claim 29 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Cummin '830 in light of Yokoyama '971, and further in view of Kleeberg '290 (USP 5,089,290).

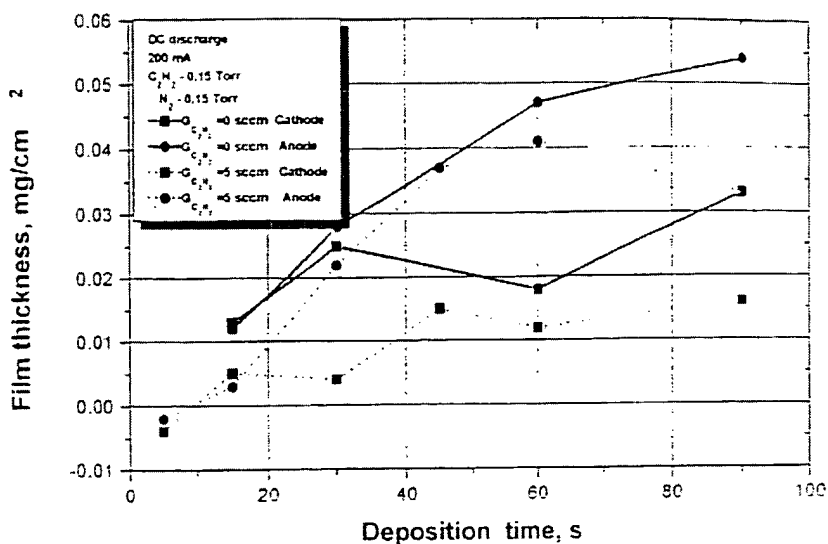
All of the above-noted rejections are traversed for the following reasons.

*The Present Invention And Its Advantages*

The present invention pertains to a method for surface processing by plasma polymerization of a surface of a metal by using a DC discharge plasma. As set forth in claim 1 of the present invention, and optimal processing time is used where a voltage is applied to the electrodes for 5-60 seconds in order to obtain the DC discharge plasma.

Among the unexpected results obtained by the present invention, one may note the relationship between film thickness and discharge time set forth in Fig. 16A, which is reproduced below.

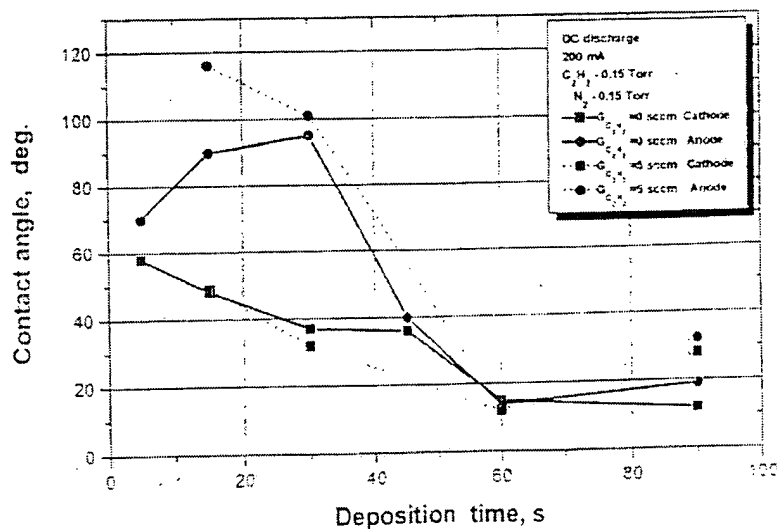
FIG. 16A



As shown in Figure 16A, a polymeric coating is synthesized on the anode substrate over time and the thickness of the coating increases. However, after a time period of 60 seconds, the thickness of the coating no longer increases and instead decreases. As monomer gas continues to flow over the coating and reacts with remaining non-polymerizable gas, the thickness of the polymer synthesized on the substrate decreases. The attempt to polymerize the non-polymerizable gas and the additionally flowed monomer gas after the synthesis damages the previously formed polymer and thus reduces the thickness of the originally synthesized matter.

An additional unexpected result of the present invention is the variation of contact angle over time shown in Fig. 16B, which is reproduced below.

FIG. 16B



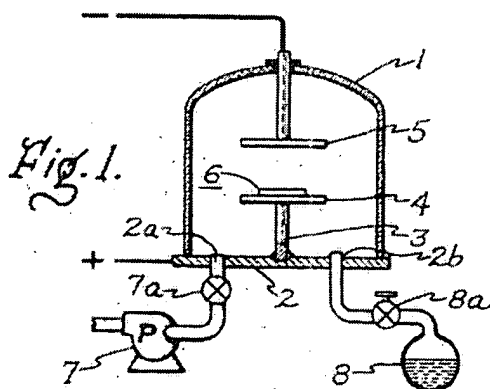
As shown in Figure 16B, the contact angle varies according to the processing time. The cathode and the anode have the lowest values at 60 seconds when the gaseous pressure reaches a minimum value. When the plasma discharge is performed for over 60 seconds, the polymer is worn due to the sputtering effect, which results in an increase in the contact angle properties.

As can be seen in Figs. 16A and 16B, when introducing monomer gas into the chamber during the discharge polymerization process, the thickness of the polymer increases, however the film thickness and contact angle properties deteriorate when the polymerization time is over 60 seconds.

Distinctions Over The Cited References

All of the references relied upon for the above-noted rejections fail to disclose or suggest the plasma polymerization method time period range of 5-60 seconds as recited in step (d) of present claim 1. All of these references fail to recognize the advantageously improved thickness and integrity of the polymeric coating when the appropriate time period is employed as in the method of the present invention. Additional distinctions between the present invention and the cited references are provided below.

Cummin '830 pertains to a method a making an electric capacitor as illustrated in Fig. 1, which is reproduced below.



In Cummin '830, a substrate sheet 6 including an electrical insulating material layer and a metallized layer is subjected to "glow discharge" conditions which include using DC current through electrodes 4 and 5 in a chamber 1 which is at least partially evacuated and into which a monomeric gas, such as an aliphatic unsaturated

compound gas (e.g. acetylene), is introduced optionally together with an inert carrier, such as nitrogen, as described at column 4.

Cummin '830 fails to disclose depositing a polymer through plasma polymerization on the surface of an anode electrode as in the present invention, since Cummin '830 requires that the substrate sheet 6 include an electrical insulating material layer as described at column 4, lines 43-59. In addition, Cummin '830 fails to disclose or suggest the time period feature of the present invention as discussed above.

At page 2, line 15 to page 3, line 1 of the Office Action, the Examiner tacitly admits the failure of Cummin '830 to disclose adhesion by inferring inherency: "As to the adhesion property of the films, it is inherently possessed by the films when the substrate is the anode."

However, inherency need not bar patentability. Accidental results not intended and not appreciated do not constitute anticipation. *Eibel Processing Co. v. Minnesota and Ontario Paper Co.*, 261 US 45 (1923); *Mycogen Plant Science, Inc. v. Monsanto Co.*, 243 F.3d 1316, 1336, 5 USPQ2d 1030, 1053 (2001). Further, the Federal Circuit stated in *In re Robertson*, that "to establish inherency, extrinsic evidence must make clear that the missing descriptive matter was necessarily present in the thing described in the reference, and would be so recognized by persons with ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949 (Fed. Cir. 1999). Further, it has been held that the mere fact that a certain thing may result from a given set of circumstances is not

sufficient, and occasional results are not inherent. *MEHL/Biophile International v. Milgraum*, 192 F.3d 1362, 1365, 52 USPQ2d 1303 (Fed. Cir. 1999).

In this case, Cummin '830 uses a metallized polymer film as a substrate since it is convenient to incorporate the filmed substrate as part of a capacitor (see Cummin '803 at column 4, lines 43-45). The initial layer on the polymer film is an electrode of a capacitor. A second electrode is provided after the dielectric film is deposited on the substrate. In view of this process, it is clear that the metal layer on the substrate is used as an electrode and is not used to overcome an adhesion problem.

Yokoyama '971 discloses a process for making a magnetic recording medium which employs plasma polymerization as described at column 4, lines 18-49. It appears that the substrate upon which the polymer is deposited through plasma polymerization includes all of a first substrate **2** of a non-magnetic material, an undercoat layer **3** which is preferably a nickel alloy, a magnetic layer which may be a cobalt-nickel alloy or related alloy, an intermediate magnetic layer **5** which is preferably chromium, a protective non-magnetic metal film preferably of chromium, and a topcoat layer **9** which is the plasma-polymerized film.

Yokoyama '971 fails to disclose the employment of the substrate that is plasma-polymerized as an anode electrode as in the present invention. In addition, Yokoyama '971 fails to disclose or suggest the time period feature of the present invention as discussed above.

At page 3, lines 6-12 of the Office Action, the Examiner admits to at least some of the failings of Cummin '830 and Yokoyama '971 but insists that the missing subject matter can be obtained via optimization:

The difference between Cummin and the above claims is the recited period of applying the voltage. Because Cummin teaches the film thickness of less than 0.5 micron, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Cummin's teachings in light of Yokoyama as it has been settled that proper adjustment of a known effect variable of a known or obvious process is within the capabilities of one having ordinary skill in the art.

However, as was discussed above, the time period of applying voltage is an unexpected result and not a result-effective variable. In general, a polymer is synthesized on the substrate with the lapse of a certain time and thus the thickness of the polymer increases. However, the inventors of the present invention have unexpectedly found that after 60 seconds, the thickness of the polymer no longer increases and instead it is reduced (see Fig. 16A). It has also been found that when monomer gas continues to flow to the synthesized substrate and is reacted with remaining non-polymerizable gas, the thickness of the polymer synthesized on the substrate is reduced.

Moreover, as shown in Fig 16B, the contact angle varies according to the processing time. The cathode and the anode have the lowest values at 60 seconds at which the gas pressure has a minimum value. When the plasma discharge is performed for over 60 seconds, the polymer degrades due to a sputtering effect, which results in an increase in the contact angle.



As can be seen in Figs. 16A and 16B, when introducing monomer gas into the chamber during the discharge polymerization process, the thickness of the polymer increases. However, the contact angle decreases when the polymerization time is over 60 seconds.

Furthermore, Cummin '830 fails to teach a post process for improving the hydrophilic property of the surface of the substrate. As is now set forth in claim 1 of the present invention, the polymer "is surface-processed by a plasma of at least one non-polymerizable gas selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>, CO<sub>2</sub>, CO, H<sub>2</sub>O and HN<sub>3</sub> gas in order to improve the hydrophilicity of the polymer."

The Examiner turns to Yanagihara '799 for teachings pertaining to periodicity of DC discharge. The Examiner turns to Kleeberg '290 for teachings pertaining to annealing. However, these teachings of Yanagihara '799 and Kleeberg '290 fail to address the deficiencies of Cummin '830 and Yokoyama '971 in suggesting a claimed embodiment of the present invention as set forth in claim 1. A *prima facie* case of obviousness has not been made over claim 1. Claims depending upon claim 1 are patentable for at least the above reasons. Even if obviousness could be inferred, this obviousness would be fully rebutted by the unexpected results typified by Figs. 16A and 16B of the application.

Yet further, *prima facie* obviousness over claim 36 can only be alleged by combining all four references of Cummin '830, Yokoyama '971, Yanagihara '799 and Kleeberg '290. However, this type of complicated combination can only be achieved through impermissible hindsight reconstruction.

“Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is a rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.” *In re Dembiczak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (CAFC 1999). See also *In re Kotzab*, 217 F.3d 1365, 1369-70, 55 USPQ2d 1313, 1316 (CAFC 2000). “Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor’s disclosure as a blueprint for piecing together the prior art to defeat patentability--the essence of hindsight.” *Dembiczak* at 50 USPQ2d 1617. “The invention must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time.” *Dembiczak* at 50 USPQ2d 1617. “The patent examination process centers on prior art and the examination thereof. When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references riled on as evidence of obviousness . . . The factual inquiry must be thorough and searching. It must be based on objective evidence of record.” *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-44 (Fed. Cir. 2002).

As a result, the present invention is clearly patentable over the cited art references. These rejections are overcome and withdrawal thereof is respectfully requested.

### **Information Disclosure Statement**

The Examiner is thanked for considering the Information Disclosure Statement filed June 10, 2003 and for making the initialed PTO-1449 form of record in the application in the Office Action mailed July 14, 2003. The Examiner is also thanked for considering the Information Disclosure Statements filed March 29, 2000 and July 3, 2000 and for making the initialed PTO-1449 forms of record in the application in the Office Action mailed July 30, 2002.

### **Foreign Priority**

The Examiner has acknowledged foreign priority and indicated that certified copies of the priority documents have been received in the Office Action mailed July 30, 2002.

### **The Drawings**

The Examiner is respectfully requested to indicate whether the drawing figures are acceptable in the next official action.

### **Conclusion**

The Examiner's rejections have been overcome. No issues remain. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert E. Goozner, Ph.D. (Reg. No.42,593) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.


Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a two (2) month extension of time for filing a reply in connection with the present application, and the required fee of \$225.00 is attached to the concurrently filed Notice of Appeal.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Dated: January 19, 2005

*Robert E. Goozner*

Respectfully submitted,

By 

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